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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,712	12/11/2000	Taizou Itou	Q57601	2910

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EXAMINER
GAKH, YELENA G

ART UNIT	PAPER NUMBER
1743	9

DATE MAILED: 12/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	AS-9
	09/732,712	ITOU ET AL.	
	Examiner	Art Unit	
	Yelena G. Gakh, Ph.D.	1743	

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 13-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 13-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *5, 6* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The Amendment, IDS and Supplemental IDS, filed on 11/04/02, 06/27/02 and 07/26/02, respectively, are acknowledged, as well as the priority documents and IDS, filed on 05/10/01. Claims 11, 12, and 17-21 are cancelled without prejudice. Claims 1-10, 13-16 and 22 are pending in the Application.

Response to Amendment

2 The pending claims stand rejected over the same prior art as applied in the previous Office action. The claims additionally rejected under 35 U.S.C. 112, second paragraph.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-10, 13-16 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 22 recite, "measuring infrared absorption intensity at an infrared wave number ...". It is not clear from the claims, the IR intensity of what is being measured – ammonia, water, or both?

It is not clear from the claims, what is the difference between "a gaseous phase moiety of liquefied ammonia having a water concentration of 10 ppm or less" serving as a reference gas, and "ammonia as a sample"? Does the reference gas contain exact and known amount of water? If it does not contain exact and known amount of water, how can it be a reference gas? What is "ammonia as a sample"? Is it liquefied ammonia, or a gas?

What does the expression "at which infrared absorbences of ammonia and water do not overlap as background absorption" mean? What is the "background absorption" in this case?

Usually "background absorption signal" is referred to the signal that is not measured, but rather is subtracted from the spectrum of a mixture of an interfering compound and an analyte in order to obtain the absorption of the analyte. Since in the instant case the analyte is water, it is not clear, what is meant by overlapping both signals "as background absorption".

The expression "measured intensity of the sample" in the last subparagraph is not clear. What does it mean? How the sample can have intensity? Is this a measured intensity of the absorption signal of water or something else? "The background absorption intensity" of which component is meant in the last sentence?

Claim 22 is unclear as to what is being measured and what is being used as a reference gas. Claim 1 recites "introducing a gaseous phase moiety of liquefied ammonia having a water concentration of 10 ppm or less as a reference gas". Claim 22 recites, "measuring a water concentration in ammonia having a water concentration of 10 ppm or less", wherein as the first step the "gaseous phase moiety of liquefied ammonia" is introduced as a reference gas. How these two gases, the one that is measured and the one that is used as a reference gas, differ?

Since the term "a gaseous phase moiety of liquefied ammonia" is not defined in the specification in clear and unambiguous terms, and it is not clear, if this is a gas of crude ammonia, or refined gas, a gas containing a known amount of water, an unknown amount of water, a negligible amount of water, etc., the examiner will interpret this term in the broadest meaning, i.e. as any ammonia gas, obtained from liquefied ammonia, which contains less than 10 ppm of water.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 1-10 and 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (Anal. Chem. or J. Appl. Phys (IDS)).

Wu teaches quantitative analysis of trace moisture in NH_3 gas with dual-cell near-infrared diode laser absorption spectroscopy by measuring trace moisture from 110 to 1006 ppb (p. 3321, Conclusions), using reference gas with 110, 245, and 523 ppb of H_2O in p. 3320, "Calibration of H_2O in NH_3"). Two H_2O absorption lines at 1923.162 and 1922.342 cm^{-1} were utilized, at which the absorption of NH_3 molecules was relatively small (p. 3316). A flow rate of the gas through the cells of ~ 1m long (92 cm, p. 3317) is ~ 300 cm^3/ min (0.3 L/min). Also, Wu mentions in his paper in J. Appl. Phys. the work of "Girard and Mauvis[3]", who "reported the application of an InGaAsP/InP DFB diode laser oscillating at 1368 nm with a 10m multipath cell for trace moisture measurement in NH_3. They employed an off-line subtraction method to remove the effect of interfering absorption of NH_3: the background spectrum of pure NH_3 absorption was memorized beforehand by a computer and was subtracted from the data of the actual sample gas. A calibration curve was obtained in the concentration range of 0.4 to 3.3 ppm, the detection limit of this method being estimated to be 30 parts per billion (ppb)" (p. 4788, left column).

Wu does not particularly teach measurements conducted in IR frequency range, particularly at the wave numbers listed in claims 3 and 4, and he does not disclose vaporizing liquefied ammonia to obtain ammonia.

It would have been obvious for anyone of ordinary skills in the art to find IR ranges, rather than near-IR ranges, disclosed by Wu, in which water and ammonia peaks do not overlap, as such wavelengths are known in the art, as admitted by the Applicants in the "Background Art". It would have been obvious for anyone of ordinary skills in the art to vaporize liquefied ammonia to obtain ammonia gas, because ammonia is transported and stored in liquefied form, and because measurements, disclosed by Wu, are conducted for ammonia gas. For the same reason it would have been obvious for anyone of ordinary skills in the art to use purified gaseous phase moiety of liquefied ammonia with only traces of water (less than 10 ppm) as a reference gas, because Wu used reference gas with less than 10 ppm amount of water.

9. **Claims 13-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu, as applied to claims 1-10 and 22, and further in view of the prior art admitted by the Applicants (Background Art).

Wu does not specifically disclose "a method of producing ammonia having decreased water content, wherein the method comprises the steps of distilling crude ammonia".

The Applicants admit that the prior art discloses a method for producing ammonia having decreased water content by distilling crude ammonia.

It would have been obvious for anyone of ordinary skills in the art to apply slightly modified Wu's method of measuring water trace in ammonia to the production of purified ammonia by distilling crude, because the importance of accurate measurements of water traces in ammonia obtained by distillation of crude ammonia is well recognized in the art, as admitted by the Applicants, and because modified Wu's method provides such accuracy.

Response to Arguments

10. Applicant's arguments filed 11/04/02 have been fully considered but they are not entirely persuasive.

First, the examiner would like to apologize for missing the priority documents and first IDS when submitted the previous Office action, as they were misplaced in the file.

The examiner admits that the Applicants are correct in their arguments regarding anticipatory issues of the prior art. Wu in fact cannot be considered as anticipating the instant invention, as he discloses near-IR, rather than IR, ranges of wavelengths in his method.

However, the examiner does not agree with further arguments of the Applicants regarding non-obviousness of the instant invention over Wu. Wu discloses a method of measuring traces of water in ammonia, using reference gas with less than 10 ppm of water – exactly what is recited in the claims – except for the range of IR wavelengths. However, measurements of water in NH_3 in the ranges disclosed by the Applicants are well known in the art, and therefore it would have been obvious for anyone of ordinary skills to modify Wu's method by measuring the water content in slightly shifted IR ranges. The statement of the Applicants that "Wu ... does not disclose a measuring of a reference gas" is at least incorrect, as on page 3319, Figure 5, the "reference cell" for measuring the "reference gas" is explicitly indicated. As no specific definition of "a gaseous phase moiety of liquefied ammonia" is given in the specification (what exactly this moiety is - a purified gas, a gas from crude ammonia, with known or unknown amount of water), any type of ammonia gas obtained from liquefied ammonia can be considered "a gaseous phase moiety of liquefied ammonia", especially since ammonia is usually transported in liquid form.

As for the inaccuracy of Wu's method comparing to the one disclosed in the instant Application, the examiner does not have any grounds to doubt the accuracy of Wu's method. The Applicants call the gases containing less than **10 ppm** of water "ammonia gas containing a **negligible** water content". Wu says (p. 3319, left column) that the purified ammonia used in his method contained less than **1 ppb** (10000 times less) amount of water. It is in fact a "zero point" for measurements of **110**, **245** and **523 ppb** of water in ammonia. One-tenth amount of water in the gaseous phase relative to that in a liquid phase cannot be considered a "negligible amount" of water, and leads to at least 10% error, if is taken as a "zero point". The examiner also does not quite understand, how it is possible to use the gas without the known quantities of its components as a reference gas.

Throughout their arguments the Applicants use the expression "an ammonia gas having a negligible water content". This is a very confusing terminology. Do the Applicants mean that the water content is completely ignored when this gas used as a reference? "Negligible" means something that is not taking into account. Is this the meaning used in the present context? In other word, does it mean, that the reference gas, although containing less than 10 ppm of water (which by Wu is not considered a "negligible amount") is regarded as not containing water at all? Also, regarding non-obviousness of "other" IR ranges. It seems that the Applicants contradict themselves when saying that it would not have been obvious for anyone of ordinary skills in the art to find IR ranges wherein ammonia and water signals would not overlap. The citation taken from their own arguments (page 6) says "however, as the present inventors mention in the "Background Art" at section page 3 of the present specification, **measuring methods using a wave number wherein the ammonia and water absorbances do not overlap had been known to those skilled in the art at the time of completion of the present invention**", which makes their first statement incorrect.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (703) 306-5906. The examiner can normally be reached on 10:00am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (703) 308-4037. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7165 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Yelena G. Gakh
December 27, 2002